JHR 54: 93–112 (2017)
doi: 10.3897/jhr.54.10816
http://jhr.pensoft.net

RESEARCH ARTICLE

JOURNAL OF Hymenoptera RESEARCH
A peer-reviewed open-access journal
The International Society of Hymenopterists

Three new species of the genus *Gnamptogenys* (Hymenoptera, Formicidae) from southern China with a key to the known Chinese species

Zhilin Chen[1,3], John E. Lattke[2], Fuming Shi[1], Shanyi Zhou[3]

1 *College of Life Sciences, Hebei University, Baoding, Hebei 071002, China* **2** *Universidad Nacional de Loja, Dirección de Investigación, Programa Biodiversidad, Bosques y Servicios Ecosistémicos EC 110101 Loja, Ecuador* **3** *Key Laboratory of Ecology of Rare and Endangered Species and Environmental Protection (Guangxi Normal University), Ministry of Education, Guilin 541004, China*

Corresponding authors: *Fuming Shi* (shif_m@126.com); *Shanyi Zhou* (syzhou@mailbox.gxnu.edu.cn)

Academic editor: *M. Ohl* | Received 16 October 2016 | Accepted 17 December 2016 | Published 27 February 2017

http://zoobank.org/AA1C813D-D1C8-418A-ACF1-8A97D4B42807

Citation: Chen Z, Lattke JE, Shi F, Zhou Z (2017) Three new species of the genus *Gnamptogenys* (Hymenoptera, Formicidae) from southern China with a key to the known Chinese species. Journal of Hymenoptera Research 54: 93–112. https://doi.org/10.3897/jhr.54.10816

Abstract

Three new species of the genus *Gnamptogenys* Roger, 1863 are described from southern China: *Gnamptogenys dentihumera* Chen, Lattke & Zhou, **sp. n.**, *Gnamptogenys nanlingensis* Chen, Lattke & Zhou, **sp. n.** and *Gnamptogenys quadrutinodules* Chen, Lattke & Zhou, **sp. n.** A distribution map and an identification key to workers for the known species of China are provided.

Keywords

Formicidae, Ectatomminae, *Gnamptogenys*, new species, key, distribution map, southern China

Introduction

Gnamptogenys Roger, 1863 is the most diverse ant genus in the subfamily Ectatomminae, which is distributed throughout the tropical region except for the African and Malagasy areas (Lattke 1995, 2003). Up to now, about 137 species have been described from all over the world (Bolton 2016). There existed some confusion about the definition of the genus until Brown revised the tribe Ectatommini and redefinition *Gnamptogenys*

Copyright *Zhilin Chen et al.* This is an open access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

in 1958. Beyond that, Lattke did a lot of work in the genus (Lattke 1995, 2003, 2004, 2007). He revised the New World species and provided an identification key to the species and made a comprehensive biogeographic analysis of the genus *Gnamptogenys*, illustrating a cladistic biogeographic scenario and recognizing the several areas of endemism. He also revised all species of *Gnamptogenys* in Southeast Asia and Austrilia, and discussed their phylogenetic relationships based on nineteen terminal taxa and sixty morphological characters.

The first described species of the genus, *G. bicolor* (Emery 1889), was recorded in China by Wheeler (1930). In 1948, Brown described the *G. panda,* in Sichuan province, China. Further work was carried out on the *Gnamptogenys* fauna of China by later researchers (Wu and Wang 1995, Xu 1996, 2002, Zhou 2001, Lattke 2004, Terayama 2009), and the sporadic results were summarized in two checklists (Zhou and Ran 2010; Guénard and Dunn 2012). In terms of all taxonomic decisions mentioned, only seven *Gnamptogenys* species are recognized in China: *G. bicolor* (Emery, 1889); *G. coccina* Zhou, 2001; *G. panda* (Brown, 1948); *G. sinensis* Wu & Xiao, 1987; *G. sichuanensis* Lattke, 2004 and *G. taivanensis* (Wheeler, 1929). Comparing with the potential distribution area, this quantity is surprisingly small, an apparent indication that the diversity of *Gnamptogenys* in China is poorly known undiscovered, and there are still more species to be found certainly.

In this study, three new species of this genus are described from southern China. These three new species are fortunately easily distinguished from the already described species. A key to all known Chinese species and a map of distribution data are provided in this article.

Materials and methods

This study is based on specimens deposited in the Insect Collection of Guangxi Normal University, China. The examination of the specimens was carried out with a Leica M205A stereomicroscope. High-quality multifocused montage images were captured with a Leica DFC 450 digital imaging system. GPS coordinates were recorded from labels, references or estimated from Google Earth (http://earth.google.com/). Map was constructed using the software package ArcGIS version 10.2. All measurements are in millimeters. Standard measurements and indices are mostly as defined by Bolton (1975), with addition of ED and MSL as outlined below:

CI Cephalic Index = HW × 100 / HL.
DPI Dorsal Petiole Index = DPW × 100 / PL.
DPW Dorsal Petiole Width: maximum width of petiole in dorsal view.
ED Eye Diameter: maximum diameter of eye.
HL Head Length: straight-line length of head in perfect full-face view, measured from the mid-point of the anterior clypeal margin to the midpoint of the posterior margin. In species where one or both of these margins are concave,

the measurement is taken from the mid-point of a transverse line that spans the apices of the projecting portions.

HW Head Width: maximum width of head in full-face view, excluding the eyes.

LPI Lateral Petiole Index = PH × 100 / PL.

MSL Mesosoma Length: diagonal length of the mesosoma in lateral view, measured from the point at which the pronotum meets the cervical shield to the posterior basal angle of the metapleuron.

PH Petiole Height: height of petiole measured in lateral view from the apex of the ventral process (subpetiolar) vertically to a line intersecting the dorsalmost point of the node.

PL Petiole Length: length of petiole measured in lateral view from the anterior process to the posteriormost point of the tergite, where it surrounds the gastral articulation.

PW Pronotal Width: maximum width of pronotum measured in dorsal view.

SI Scape Index = SL × 100 / HW.

SL Scape Length: straight-line length of the antennal scape, excluding the basal constriction or neck.

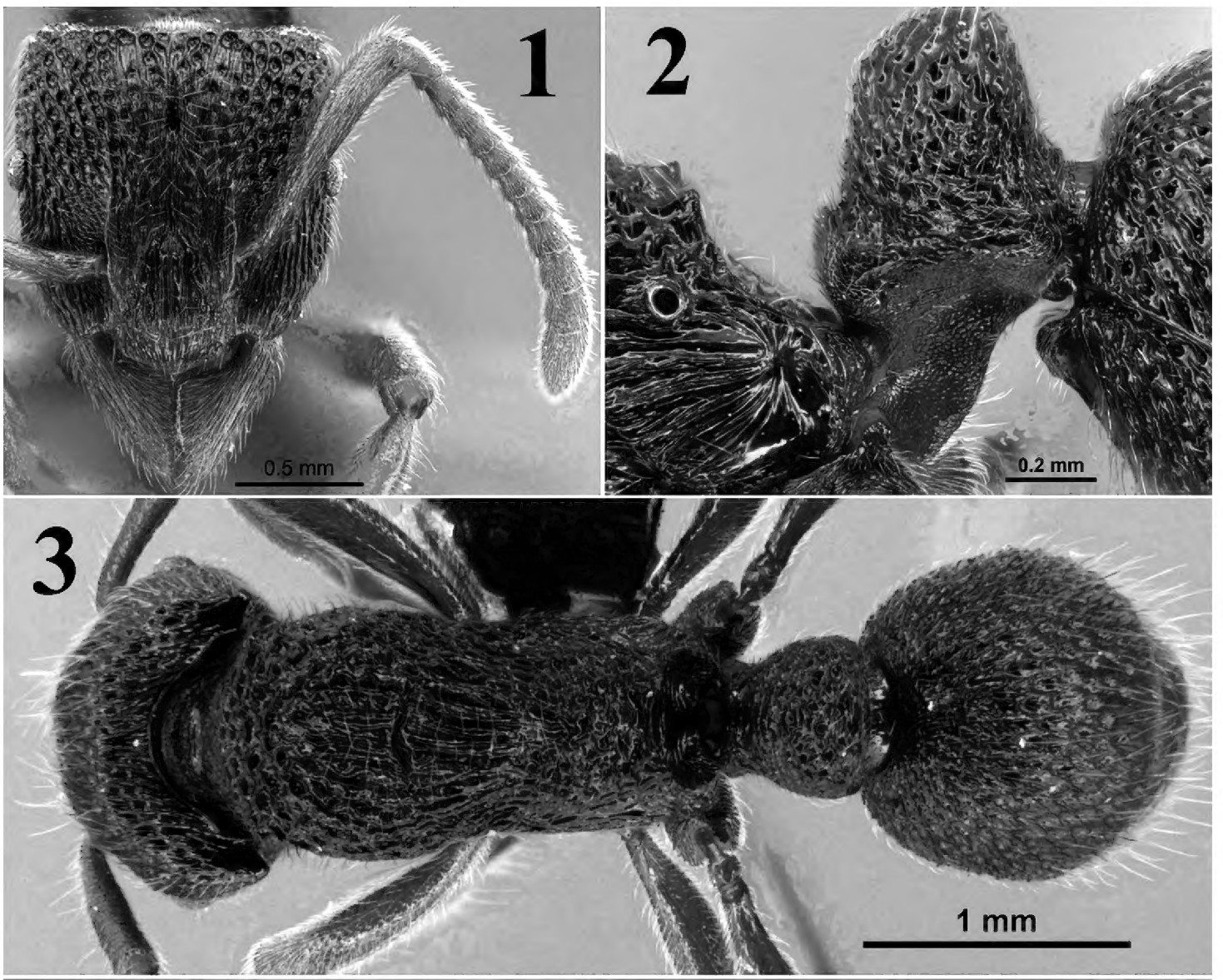
TL Total Length: total outstretched length of the individual, from the mandibular apex to the gastral apex.

Description of new species

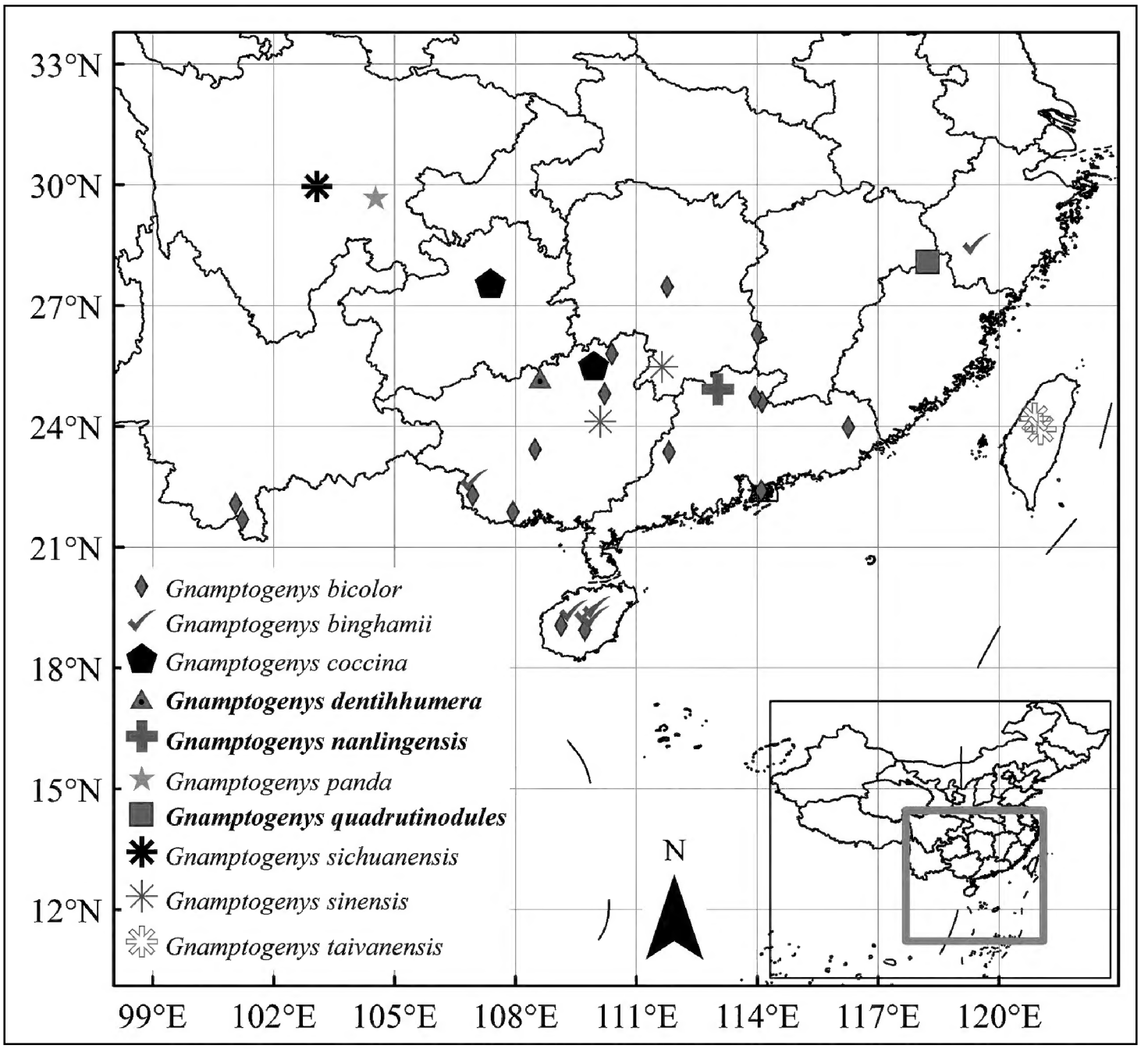
***Gnamptogenys dentihumera* Chen, Lattke & Zhou, sp. n.**
http://zoobank.org/9307A812-9B3F-4C5A-A4E8-D36B3752C682
Figs 1–10; Map 1

Type material. Holotype. Worker. CHINA: Guangxi, Huanjiang County, Jiuwan Mountain, 25°11'00"N, 108°36'57"E, 925m, 8.VIII.2015, leg. Zhilin Chen, No. G150067. Paratypes. 12 workers and 1 queen, data the same as holotype. [1 worker holotype, 8 workers pratypes and 1 queen paratype specimens are deposited in the Insect Collection, Guangxi Normal University, Guilin, China (GXNU); 2 workers paratypes will be deposited in the Insect Collection, Southwest Forestry University, Kunming, Yunnan Province, China (SWFU); 2 workers paratypes will be deposited in the Institute of Zoology, Chinese Academy of Sciences, Beijing, China (IZCAS)].

Holotype worker (Figs 1–4). TL 4.61, HL 1.45, HW 1.22, CI 84, SL 1.05, SI 86, ED 0.14, PW 0.96, MSL 1.71, PL 0.41, PH 0.95, DPW 0.58, LPI 231, DPI 141. In full-face view head rectangular, longer than broad; posterior margin almost straight, posterior corner bluntly angular, lateral margin weakly convex. Mandible triangular, masticatory margin crenulate. Anterior margin of clypeus with convex to bluntly pointed median lobe. Antennal scape just slightly surpassing posterior corner of head, flagellar segments longer than broad. Eye small, with 10 ommatidia along maximum diameter, situated on midpoint of cephalic lateral margin.



Figures 1–4. *Gnamptogenys dentihumera* holotype worker (No. G150067). **1** head in full-face view **2** petiole in lateral view **3** body in dorsal view **4** body in lateral view.

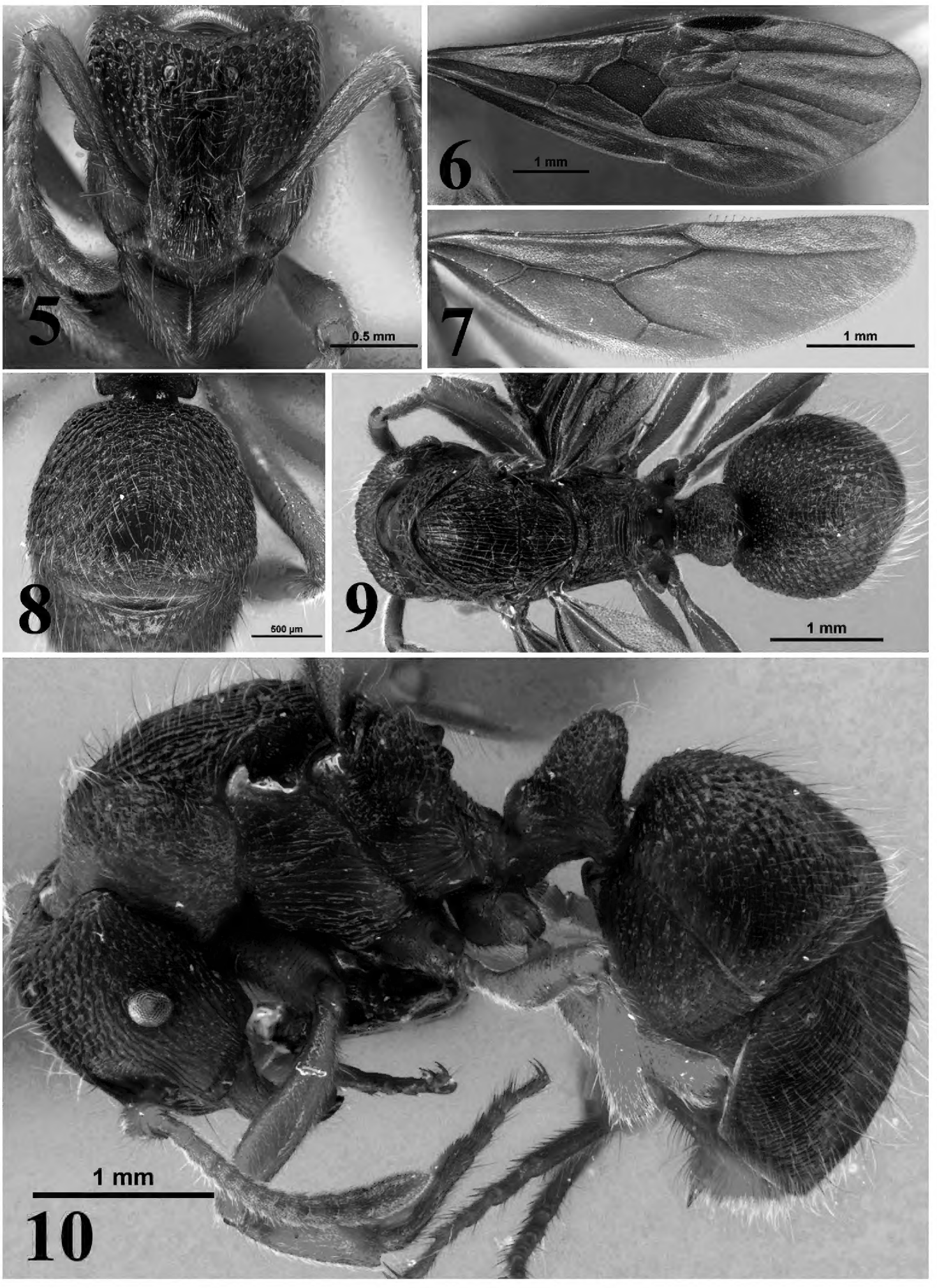


Map 1. Distribution of ten known species of the genus *Gnamptogenys* in China. The data came from collection specimens and literatures.

In lateral view occipital lamella of head forming a blunt triangular denticle. Dorsum of mesosoma strongly convex, promesonotal suture slightly impressed. Propodeum with short triangular denticle; propodeal declivity weakly concave close to tooth then relatively straight. Petiole roughly trapezoidal, about 2.1 times higher than long, dorsal and anterior margins weakly convex, posterior margin straight, subpetiolar process broadly triangular. Sting extruding.

In dorsal view anterolateral margin of pronotum with strong constriction, forming pointed denticle on humeral area. Metanotal groove ambiguously evident, evidenced by a change in sculpturing. Petiolar anterior corner rounded, lateral margin weakly convex in dorsal view.

Mandibular dorsum and clypeus with longitudinal fine striae; cephalic dorsum mostly longitudinally rugulose-foveolate; side of pronotum, propodeum, petiole and third abdominal tergite and sternite rugulose-foveolate; posteromediand pronotum and mesonotum with longitudinal striae; propleuron irregularly rugulose; meso- and



Figures 5–10. *Gnamptogenys dentihumera* paratype queen. **5** head in full-face view **6** forewing in dorsal view **7** hindwing in dorsal view **8** gaster in dorsal view **9** body in dorsal view **10** body in lateral view.

metapleuron longitudinally striate; fourth abdominal tergite finely irregularly rugulose, sternite rugulae denser than on tergite. Propodeal declivity transversely striate. Head, mesosoma, petiole, and gaster with abundant suberect hairs and sparse decumbent pubescence. Scape and tibiae with sparse sub-decumbent hairs and dense decumbent pubescence. Body color black; mandible, antenna and leg reddish-brown.

Paratype workers (n = 12). TL 4.56–4.65, HL 1.43–1.45, HW 1.20–1.23, CI 83–85, SL 1.03–1.05, SI 84–87, ED 0.13–0.15, PW 0.94–0.95, MSL 1.70–1.72, PL 0.40–0.43, PH 0.93–0.96, DPW 0.56–0.58, LPI 230–233, DPI 137–143. General appearance as in holotype, with some specimens reddish brown to yellowish brown in color. We believe they are callow workers.

Paratype queen (Figs 5–10). TL 6.42, HL 1.55, HW 1.21, CI 78, SL 1.11, SI 91, ED 0.25, PW 1.21, MSL 2.31, PL 0.37, PH 1.12, DPW 0.71, LPI 302, DPI 191. In full-face view head rectangular, longer than broad, posterior margin weakly concave, posterior corner bluntly angular, lateral margin almost parallel. Three ocelli on vertex (two lateral and one median) bordered by dark patches. Mandible triangular, masticatory margin crenulate. Anterior margin of clypeus with convex to bluntly pointed median lobe. Antennal scape just slightly surpassing posterior corner of head. Eye situated on midpoint of lateral cephalic margin.

In lateral view occipital lamella of head forming blunt point. Dorsum of mesosoma convex. Promesonotal suture obvious. Petiole relatively thin, anterior margin convex, posterior margin straight, dorsal and anterior margin with no obvious boundary, subpetiolar process broadly triangular. Sting extruding.

In dorsal view anterior margin of pronotum rounded; metanotal groove distinct. Metanotum oval, very narrow, bordered by mesoscutellum and propodeum. Petiole anterior weakly rounded.

Forewing and hindwing of queen shown in Figs 6–7.

Mandibular dorsum, anterolateral cephalic surface and middle part of clypeus with fine longitudinal striae. Head, pronotum, propodeum and petiole coarsely rugulose; middle part of mesonotum longitudinally striate; propleuron irregularly rugulose; mesopleuron and metapleuron longitudinally rugulose; in lateral view, third abdominal tergite with semicircular rugulae; fourth abdominal tergite with fine short rugulae; propodeal declivity transversely striate. Head, mesosoma, petiole, and gaster with abundant sub-erect hairs and sparse decumbent pubescence; scape and tibiae with sparse subdecumbent hairs and dense decumbent pubescence. Whole body reddish-brown.

Male. Unknown.

Habitat. This species was found nesting in deadwood of a branch on the ground in a subtropical evergreen broad-leaved forest, at the altitude of 925 m. All ants came from the same nest.

Etymology. This species is named from the Latin words "dent" (denticle) and "humer" (humeral), referring to the pronotum humeral area forming a pair of pointed denticles.

Differential diagnosis. The workers of *G. dentihumera* are similar to workers of *G. panda*, but *G. dentihumera* can be distinguished from the latter by propodeum

with short triangular denticle and triangular subpetiolar process. The workers of *G. dentihumera* also resemble *G. sinensis*, but differ from the latter by the occipital lamella of head shaped as a blunt triangular denticle, and the pronotal humeral denticle of the workers of *G. dentihumera* is short, pointing laterally, unsurpassing the anterior margin of pronotum.

Gnamptogenys nanlingensis Chen, Lattke & Zhou, sp. n.

http://zoobank.org/C44A19B0-1C50-4DC1-A722-5992C11F7420

Figs 11–14; Map 1

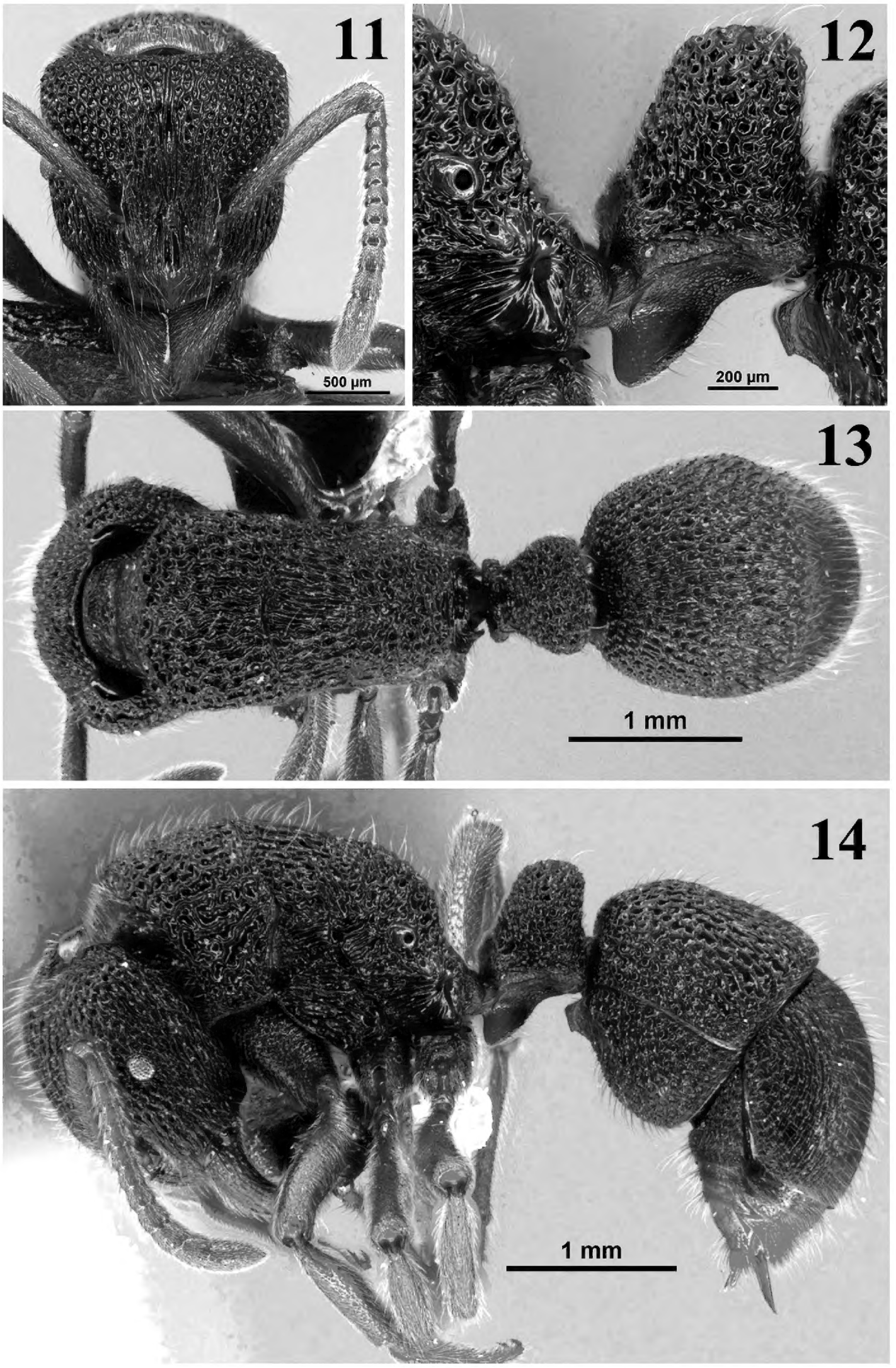
Type material. Holotype. worker. CHINA: Guangdong, Nanling National Nature Reserve, 24°54'38"N, 113°01'23"E, 1075m, 15.V.2015, leg. Zhilin Chen, No. G150025. Paratypes. 4 workers, data the same as holotype. [1 worker holotype and 2 workers paratype specimens are deposited in the Insect Collection, Guangxi Normal University, Guilin, China (GXNU); 1 worker paratype will be deposited in the Insect Collection, Southwest Forestry University, Kunming, Yunnan Province, China (SWFU); 1 worker paratype will be deposited in the Institute of Zoology, Chinese Academy of Sciences, Beijing, China (IZCAS)]

Holotype worker (Figs 11–14). TL 5.34, HL 1.65, HW 1.45, CI 87, SL 1.23, SI 85, ED 0.15, PW 1.21, MSL 2.11, PL 0.44, PH 1.05, DPW 0.66, LPI 238, DPI 150. In full-face view head trapezoid, longer than broad and widened posteriorly, posterior margin broadly concave, posterior corner rounded, lateral margin almost straight. Mandible triangular, masticatory margin crenulate. Anterior margin of clypeus with convex to bluntly pointed median lobe. Antennal scape just reaching posterior corner of head. Eye small, with 9 ommatidia along maximum diameter, situated on the midpoint of cephalic lateral margin.

In lateral view posterior corner of head with small narrow, non-translucent lamella. Dorsum of mesosoma strongly convex. Promesonotal suture obvious. Propodeum without denticle, posterodorsal corner rounded. Petiole roughly trapezoid, about 2.25 times higher than long, dorsal margin weakly convex, anterior and posterior margin straight; subpetiolar process broadly triangular. Sting extruding.

In dorsal view pronotal humeral angle well-developed but not protuberant; lateral margin of pronotum almost straight, anterior margin convex, posterior margin concave. Metanotal groove inconspicuous. Petiole anterior corner rounded, posterior corner blunt.

Mandible and clypeus with longitudinally fine striae; head, side of mesonotum, petiole and third abdominal tergite rugulose-foveolate; middle part of mesonotum with five longitudinal striae; pronotum, propleuron and propodeum irregularly rugulose; fourth abdominal tergite finely rugulose-punctate, sternite densely coarsely punctate; propodeal declivity with 7–8 transverse striae. Head, mesosoma, petiolar node and gaster with abundant sub-erect hairs and sparse decumbent pubescence; mandible with decumbent hairs; scape and tibiae with sparse sub-decumbent hairs and dense decumbent pubescence. Body color black; mandible, antenna, and leg reddish-brown.



Figures 11–14. *Gnamptogenys nanlingensis* holotype worker (No. G150025). **11** head in full-face view **12** petiole in lateral view **13** body in dorsal view **14** body in lateral view.

Paratype workers (n = 3). TL 5.30–5.37, HL 1.62–1.66, HW 1.44–1.46, CI 86–88, SL 1.21–1.24, SI 82–85, ED 0.14–0.15, PW 1.20–1.22, MSL 2.10–2.13, PL 0.43–0.44, PH 1.03–1.05, DPW 0.63–0.66, LPI 237–239, DPI 148–151. As holotype.

Queen and male. Unknown.

Habitat. This species nests in deadwood of ranch on ground in subtropical evergreen broad-leaved forest, at the altitude of 1075 m.

Etymology. This species is named after its type-locality, "Nanling" National Nature Reserve of Guangdong Province, China.

Differential diagnosis. The workers of *Gnamptogenys nanlingensis* are easily distinguished from other *Gnamptogenys* by a combination of the following characters: large (HW≥1.44mm); pronotal humeral angle well-developed, but not forming denticle or spine; lateral margin of pronotum strongly convex, posterior margin concave; propodeum without denticle, posterodorsal corner rounded; pronotum, propleuron and propodeum, with strongly and irregularly rugulose; fourth abdominal tergite finely rugulose-punctate.

The workers of *G. nanlingensis* are morphologically similar to *G. sichuanensis*. However, in *G. nanlingensis* the subpetiolar process is triangular or cuneiform, while in *G. sichuanensis* the subpetiolar process is polygonal, with the anteroventral corner bluntly angular, the ventral margin concave, and the posteroventral corner rounded. *G. nanlingensis* has a narrow and inconspicuous occipital cephalic lamella, while the cephalic lamella of *G. sichuanensis* is well developed, but thin and almost translucent lamella. The fourth abdominal sternite in *G. nanlingensis* is reticulate-rugose, while in *G. sichuanensis* it istransversely striate.

Gnamptogenys quadrutinodules Chen, Lattke & Zhou, sp. n.

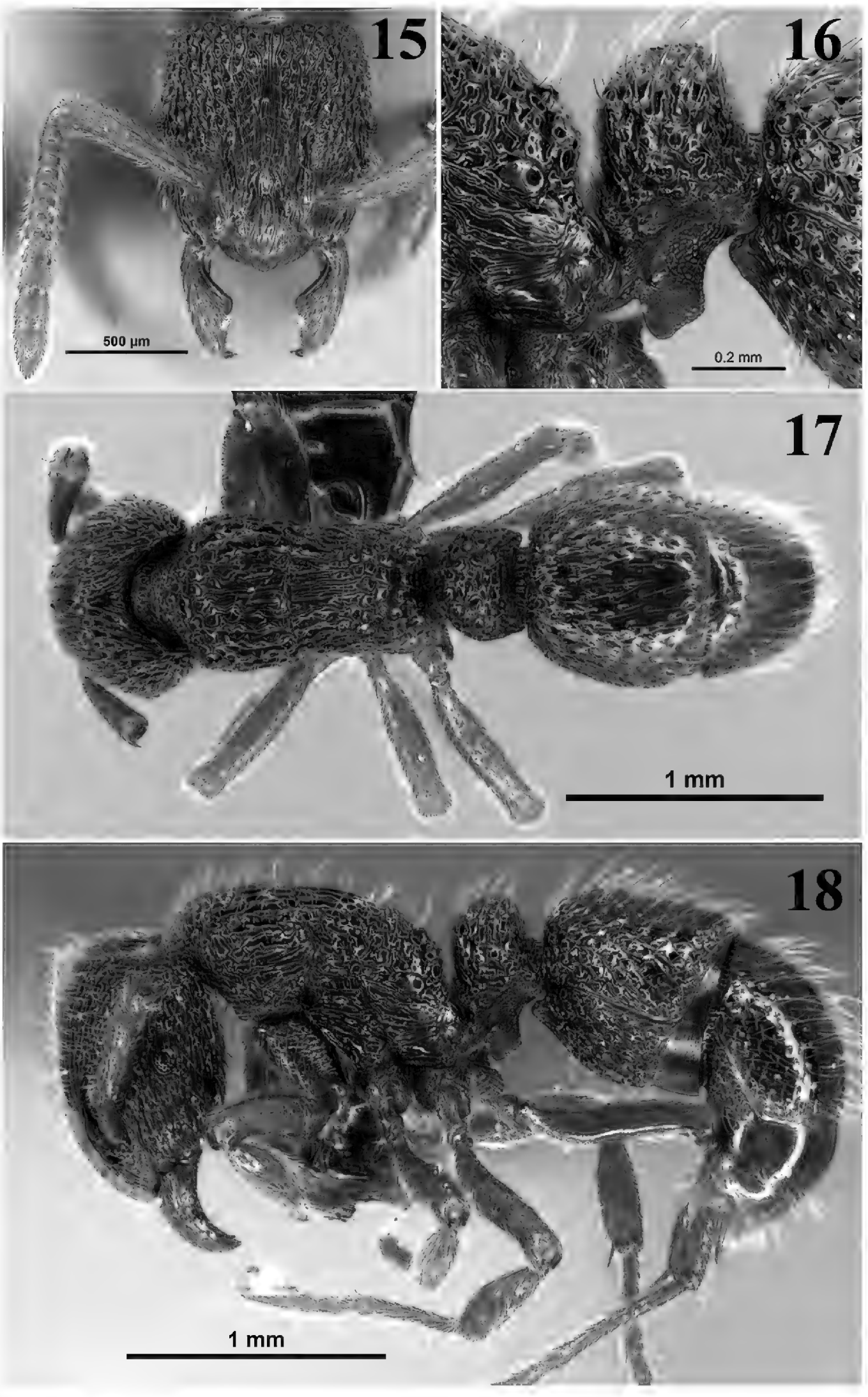
http://zoobank.org/2510DBF8-BAD4-414F-BC7B-50988A166DC3

Figs 15–28; Map 1

Type material. Holotype worker**.** CHINA: Jianxi, Guangfeng County, Tongbo Mountain, 28°05'35"N, 118°14'20"E, 1026m, 2.IX.2012, leg. Chunwen Lu, No. G120081. Paratypes. 2 workers, 1 male and 1 queen, data the same as holotype. [The holotype and paratypes are deposited in the Insect Collection, Guangxi Normal University, Guilin, China (GXNU)].

Holotype worker (Figs 15–18). TL 4.22, HL 1.05, HW 0.86, CI 82, SL 0.73, SI 84, ED 0.08, PW 0.71, MSL 1.31, PL 0.25, PH 0.61, DPW 0.50, LPI 244, DPI 200. In full-face view head rectangular, distinctly longer than broad, posterior margin almost straight, posterior corner nearly right-angular, lateral margin slightly convex. Mandible triangular, masticatory margin crenulate. Anterior margin of clypeus with convex to bluntly pointed median lobe. Antennal scape just reaching posterior corner of head, flagellar segments 3–7 broader than long. Eye very small, with 5 ommatidia along maximum diameter, situated on the midpoint of lateral cephalic margin.

In lateral view occipital lamella of head narrow and inconspicuous; dorsum of mesosoma moderately convex; promesonotal suture obvious. Propodeum with short triangular



Figures 15–18. *Gnamptogenys quadrutinodules* holotype worker (No. G120081). **15** head in full-face view **16** petiole in lateral view **17** body in dorsal view **18** body in lateral view.

denticle; propodeal declivity longitudinally weakly concave, laterally with margin. Petiole roughly sub-quadrate, about 1.7 times higher than long, anterior corner slightly rounded, posterior corner bluntly angulate, dorsal and anterior margin weakly convex, posterior margin straight. Subpetiolar process subquadrate. Sting extruding.

In dorsal view humeral angle rounded; promesonotal suture visible; metanotal groove absent. In dorsal view petiolar node with approximate semicircular anterolateral margin, anterior margin convex and separated from lateral margin by weak blunt angle, lateral margin weakly convergent posteriorly, each margin weakly convex; posterior margin weakly concave; node about 1.5 times as long as broad; anterior petiolar corner rounded, posterior corner blunt.

Mandibular dorsum and clypeus with longitudinal fine striate; space between frontal carinae with four longitudinal striae, rest of head partly rugulose-foveolate; pronotum, propodeum, petiole and anterior two-thirds of third abdominal tergite rugulose-foveolate; middle part of mesonotum with four longitudinal striae; propleuron, mesopleuron and metapleuron irregularly rugulose; dorsum of fourth abdominal tergite smooth, sides with fine short rugulae; propodeal declivity reticulate-rugose. Head, mesosoma, petiole, and gaster with abundant sub-erect hairs. Scape and tibiae with sparse sub-decumbent hairs. Head, mesosoma and petiole black-brown; mandible, antenna, gaster and legs reddish-brown.

Paratype workers (n = 2). TL 4.18–4.23, HL 1.02–1.06, HW 0.84–0.87, CI 80–83, SL 0.71–0.74, SI 82–85, ED 0.08–0.09, PW 0.70–0.73, MSL 1.30–1032, PL 0.23–0.26, PH 0.61–0.63, DPW 0.48–0.51, LPI 243–245, DPI 198–202. As the holotype.

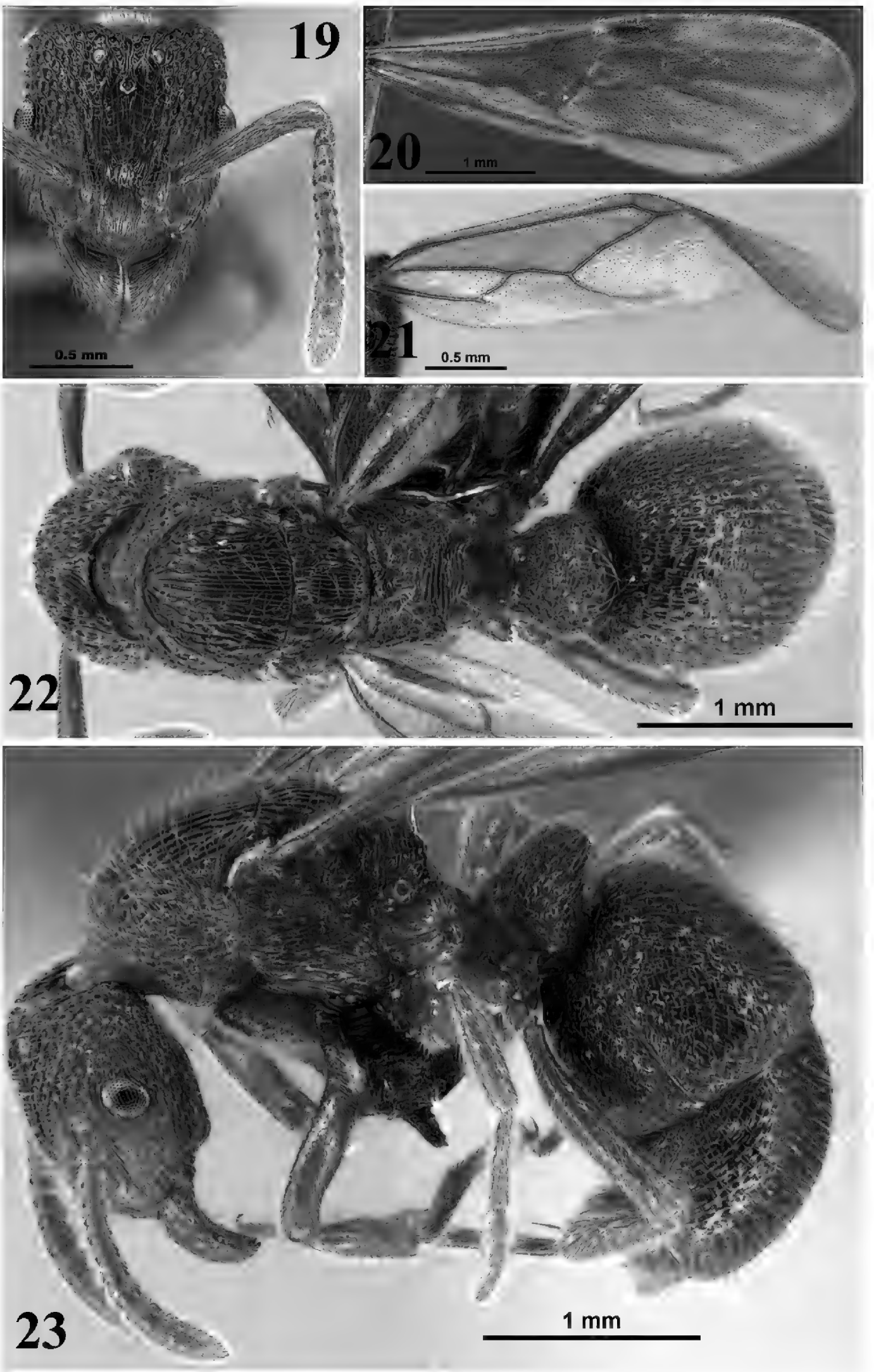
Paratype queen (Figs 19–23). TL 5.52, HL 1.21, HW 0.96, CI 79, SL 0.81, SI 84, ED 0.21, PW 0.96, MSL 1.61, PL 0.25, PH 0.72, DPW 0.42, LPI 288, DPI 168. In full-face view head rectangular, longer than broad, middle of posterior margin weakly concave, posterior corner bluntly angular, lateral margin weakly convex. Three ocelli on vertex (two lateral and one median). Mandible triangular, masticatory margin crenulate. Anterior margin of clypeus with convex to bluntly pointed median lobe. Antennal scape almost reaching posterior corner of head. Eye large, more than 20 ommatidia present along maximum diameter, situated on midpoint of lateral cephalic margin.

In lateral view occipital lamella of head narrow and inconspicuous. Dorsum of mesosoma moderately convex. Promesonotal suture obvious; propodeum with short triangular denticle; propodeal declivity weakly concave. In lateral view petiole trapezoid, anterior corner slight rounded, posterior corner angulate, dorsal margin weakly convex, anterior and posterior margins straight. Subpetiolar process sub-quadrate. Sting extruding.

In dorsal view pronotal anterolateral corner rounded. Metanotal groove distinct. Petiole relatively thick, anterior margin slightly convex.

Forewing and hindwing of queen as shown in Figs 20–21.

Mandible dorsum, gena and clypeus with longitudinal fine striae; head, pronotum, propodeum, propleuron and petiole coarsely rugulose; mesonotum with longitudinal striae; mesopleuron and metapleuron longitudinally rugulose; third abdominal tergite rugulose-punctate; fourth abdominal tergite with scattered piligerous punctures; de-



Figures 19–23. *Gnamptogenys quadrutinodules* paratype queen (No. G120081). **19** head in full-face view **20** forewing in dorsal view **21** hindwing in dorsal view **22** body in dorsal view **23** body in lateral view.

clivity transversely striate. Head, mesosoma, petiolar node and gaster with abundant sub-erect hairs; scape and tibiae with sparse sub-decumbent hairs and dense decumbent pubescence. Whole body reddish-brown.

Paratype male. (Figs 24–28). TL 4.73, HL 0.85, HW 0.76, CI 89, SL 0.21, SI 27, ED 0.36, PW 0.82, MSL 1.61, PL 0.45, PH 0.33, DPW 0.36, LPI 73, DPI 80. In full-face view head oval. Eyes large, maximum diameter about 0.35mm, occupying about half of lateral cephalic margin, situated on midpoint of lateral cephalic margin. Three ocelli on vertex (two lateral and one median). Frontal carina short. Mandible triangular, masticatory margin with many small teeth; anterior margin of clypeus broadly rounded. Antennal scape short, just reaching anterior margin of median ocellus.

In lateral view posterior carinae of head conspicuous. Mesoscutellum higher than mesoscutum; mesopleural oblique furrow distinctly wide. Propodeal lobe bluntly triangular; dorsum of propodeum as long as declivity, posterodorsal corner inconspicuous. Petiole elongated oval; subpetiolar process shaped as rounded translucent lamella.

In dorsal view mesosoma spindle-shaped. Parapsidal sulcus and notaulus present, notaulus conspicuous. Metanotum small, not reaching to the lateral margins. Petiole trapezoidal, anterior margin slightly convex, posterior margin straight, anterior corners rounded.

Forewing and hindwing of male as shown in Figs 25–26.

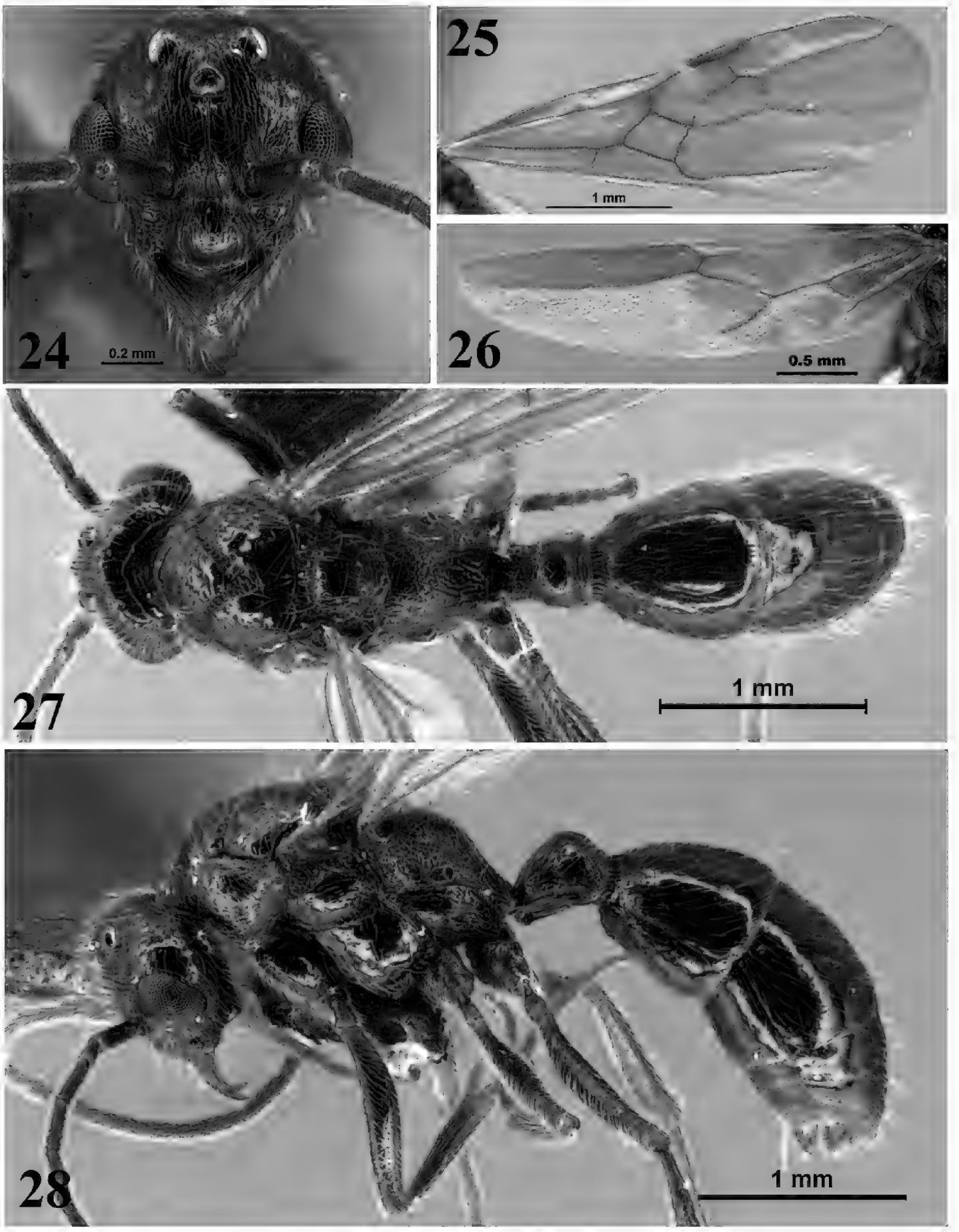
Mandibular dorsum and declivity of propodeum longitudinally finely striate; head, metapleuron and petiole irregularly finely rugulose; pronotum, propleuron, mesopleuron smooth; anterior margin of first gastral tergite with short striae; declivity longitudinally striate. Head and mesosoma with abundant sub-erect hairs, petiole and gaster sparse sub-decumbent hairs and decumbent pubescence; scape and tibiae with sparse sub-decumbent hairs and dense decumbent pubescence. Whole body black-brown.

Habitat. The specimens were found nesting under a stone in broadleaf forest and conifer mixed forest at the altitude of 1026 m.

Etymology. This species is named from the Latin words "quadrat" (quadrate) and "nodules" (petiole), referring to its nearly square petiole.

Differential diagnosis. The workers of *G. quadrutinodules* are distinguished from workers of other species of *Gnamptogenys* by the combination of the following characters: small eye, with 5 ommatidia along the maximum diameter; occipital lamella of head of head narrow and inconspicuous; petiole with anterior corner slight rounded and posterior corner bluntly angulate, node roughly sub-quadrate with dorsal and anterior margins weakly convex, posterior margin straight. Subpetiolar process sub-quadrate.

The workers of *G. quadrutinodules* are quite similar to those of *G. coccina* Zhou, 2001 and *G. taivanensis* (Wheeler, 1929). *G. quadrutinodules* can be distinguished from *G. taivanensis* by the rough rugose-punctate sculpturing of abdominal tergite III vs the diminished sculpturing on *G. quadrutinodules*, the shape of subpetiolar process seems different in the two species and the general color pattern for the workers also seems different. The distribution range of *G. quadrutinodules* may be sympatric with that of *G. coccina* (Map. 1). Most of the specimens of *G. coccina* were collected from subtropical forests of Guangxi Zhuang Autonomous Region, China, and once recorded



Figures 24–28. *Gnamptogenys quadrutinodules* paratype male (No. G120081). **24** head in full-face view **25** forewing in dorsal view **26** hindwing in dorsal view **27** body in dorsal view **28** body in lateral view.

from Hubei province by Wang et al. (2009). So far the location of *G. quadrutinodules*, Jiangxi province, was not found the distribution of *G. coccina*. But Jiangxi, Guangxi and Hubei Provices compose triangle-distributed. So the *G. coccina* is likely to exist in Jiangxi, and which is impossible through distribution range to roughly distinguish

G. quadrutinodules from *G. coccina*. So far *G. coccina* has not been found in sympatry with *G. quadrutinodules* but the present records suggest the likely presence of *G. coccina* in Jiangxi Province so assuming allopatry as as a rough sorting criteria for the two species is probably not a good idea.

However, the worker of *G. quadrutinodules* is distinguished from workers of *G. coccina* by the following characters: Promesonotal suture ambiguous; 3–7 flagellar segments broader than long; in lateral view petiole roughly sub-quadrate, in dorsal view petiole broader than long; subpetiolar process sub-quadrate.

Key to *Gnamptogenys* species found in China based on the worker caste

1 Petiolar node in lateral view low and rounded, the anterior margin curving continuously onto the dorsal margin (Fig. 29A) **2**

– Petiolar node in lateral view erect, with distinct anterior and posterior margins and a well-defined dorsal margin (Fig. 29B) **3**

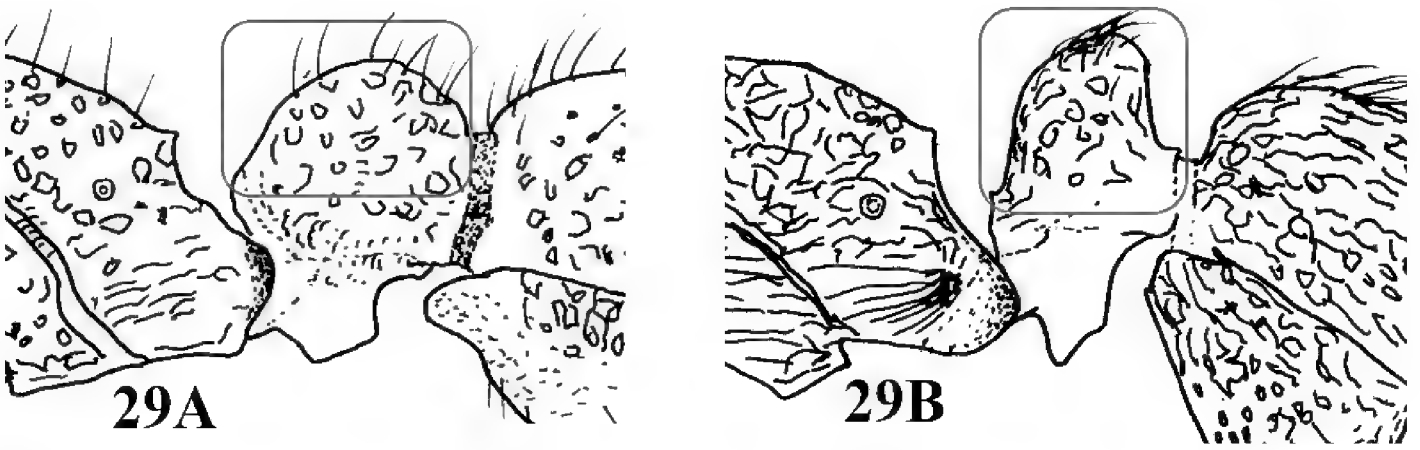


Figure 29. A *G. binghamii* worker **B** *G. taivanensis* worker.

2 Body bicolor: head and gaster black, mesosoma orange-ferruginous; subpetiolar process polygonal to triangular with an anteroventral denticle (Fig. 30A) ..... ***G. bicolor*** **(Emery)**

– Body unicolor: head, mesosoma and gaster orange-ferruginous; subpetiolar process sub-quadrate (Fig. 30B) ..... ***G. binghamii*** **(Forel)**

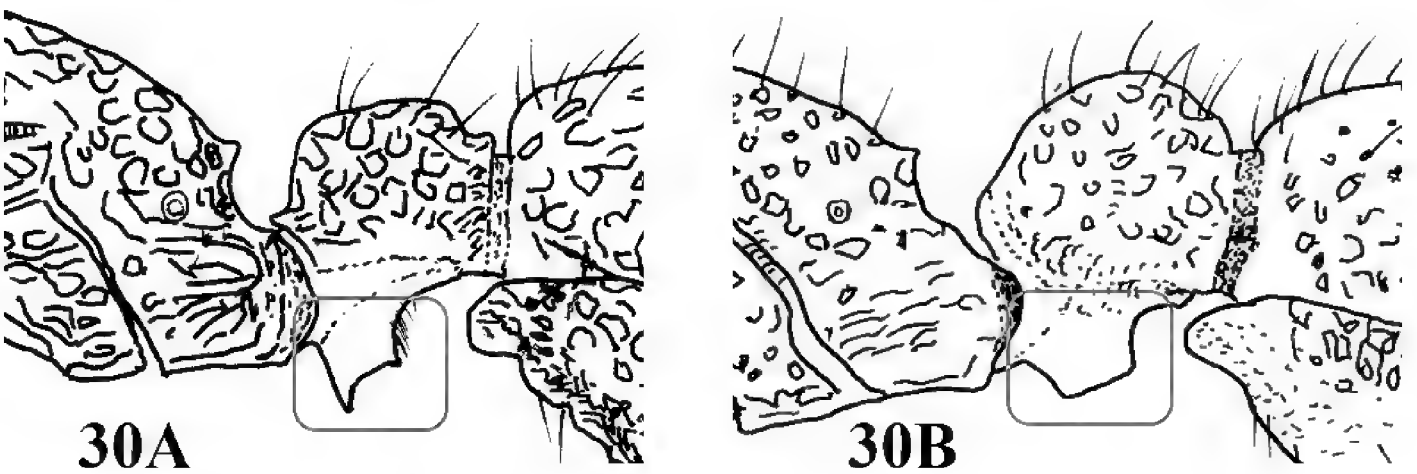


Figure 30. A *G. bicolor* worker **B** *G. binghamii* worker.

3 In lateral view occipital lamella of head forming a blunt triangular denticle (Fig. 31A, B) **4**

– In lateral view occipital lamella of head absent; if present, only forming a convex posterior margin, never angular (Fig. 31C, D) **5**

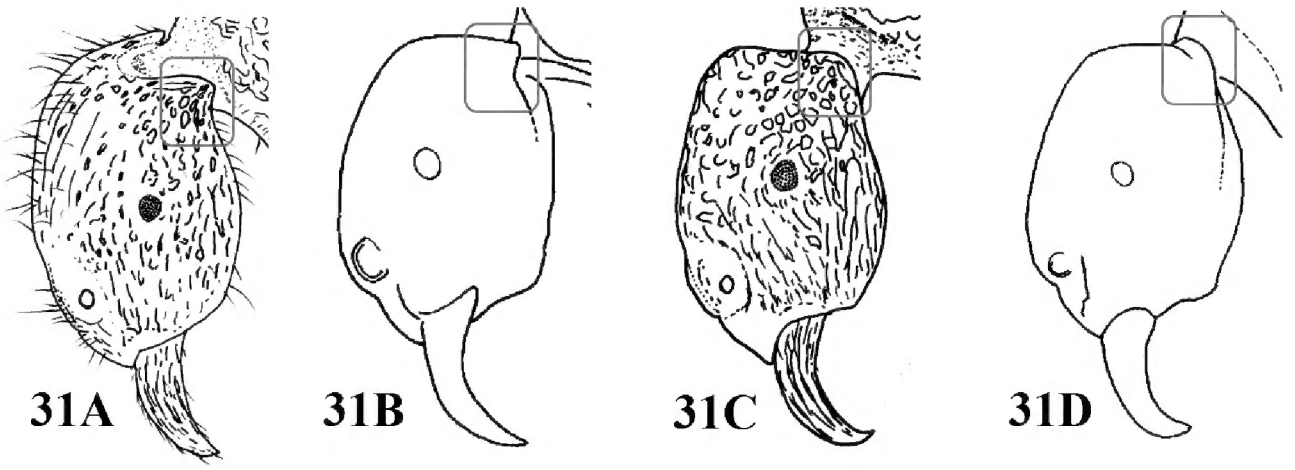


Figure 31. A *G. dentihumera* worker **B** *G. panda* worker (Cited from Lattke, 2004) **C** *G. taivanensis* worker **D** *G. sichuanensis* worker (Cited from Lattke, 2004).

4 In lateral view propodeum with short triangular denticle; subpetiolar process triangular (Fig. 32A) ..... ***G. dentihumera*** **Chen, Lattke & Zhou, sp. n.**

– In lateral view propodeum without denticle, posterodorsal corner rounded; subpetiolar process polygonal, anteroventral corner bluntly angular, ventral margin straight, posteroventral corner acute (Fig. 32B)... ***G. panda*** **(Brown)**

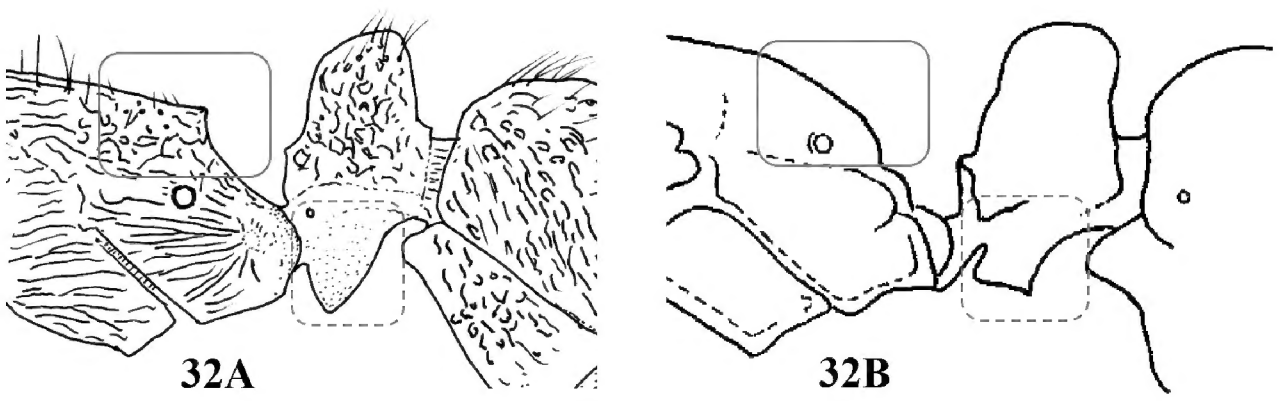


Figure 32. A *G. dentihumera* worker **B** *G. panda* worker (Cited from Lattke, 2004).

5 In dorsal view pronotum with a stout denticle on each humeral area (Fig. 33A) ..... ***G. sinensis*** **Wu & Xiao**

– In dorsal view pronotum without denticle (33B). **6**

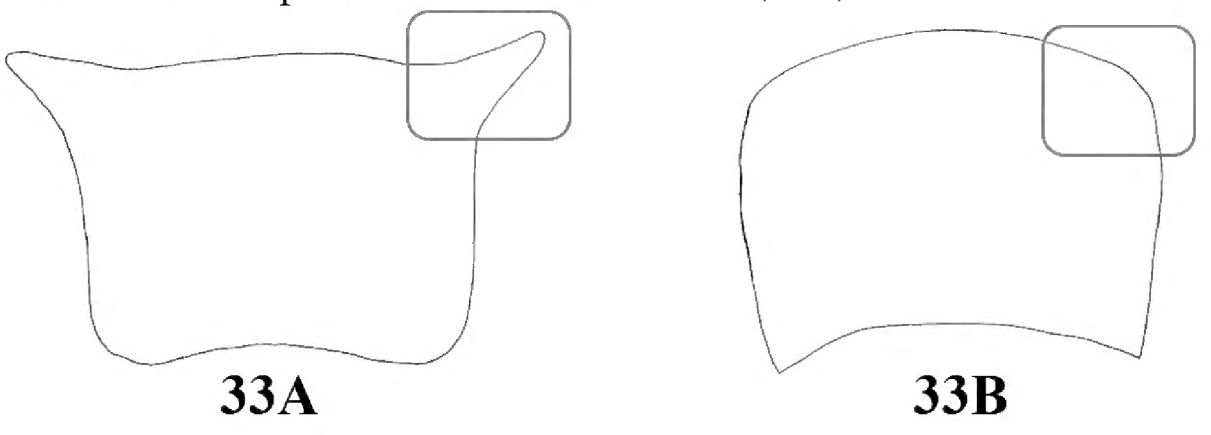


Figure 33. A *G. sinensis* worker (Cited from Zhou, 2001) **B** *Gnamptogenys* sp. worker.

6 In lateral view propodeum without denticle, posterodorsal corner rounded (Fig. 34A) 7
– In lateral view propodeum with denticle (Fig. 34B) **8**

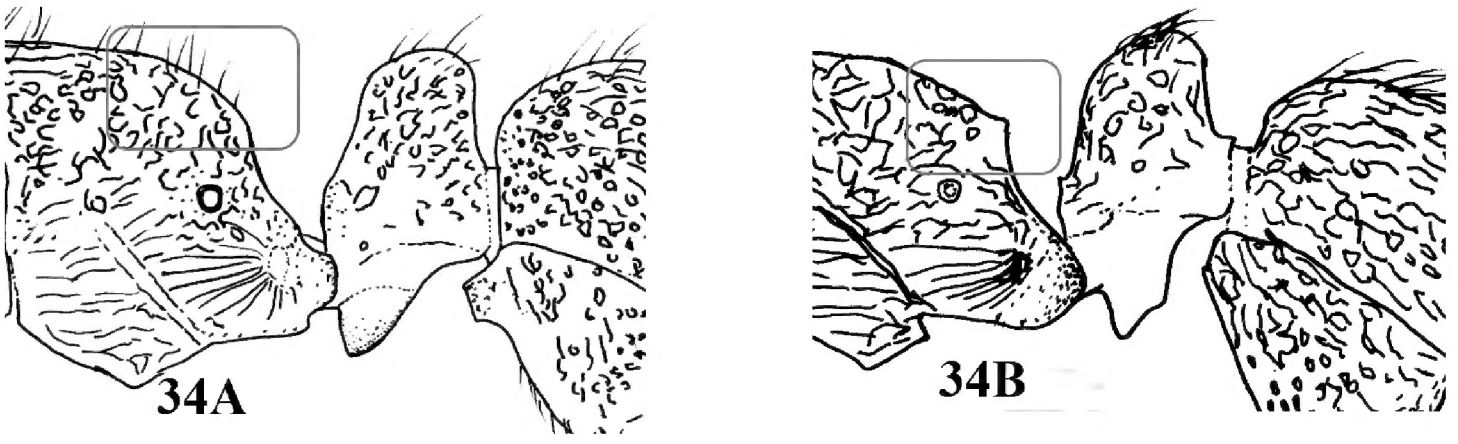


Figure 34. A *G. nanlingensis* worker **B** *G. taivanensis* worker.

7 In lateral view subpetiolar process triangular or cuneiform (35A); occipital lamella narrow and inconspicuous (Fig. 35C); fourth abdominalsternite is coarsely punctate ..... ***G. nanlingensis*** **Chen, Lattke & Zhou, sp. n.**
– In lateral view subpetiolar process polygonal, anteroventral corner angular, ventral margin concave, posteroventral corner rounded (Fig. 35B); occipital lamella well developed, with thin, almost translucent lamella (Fig. 35D); fourth abdominal sternite transversely striate ..... ***G. sichuanensis*** **Lattke**

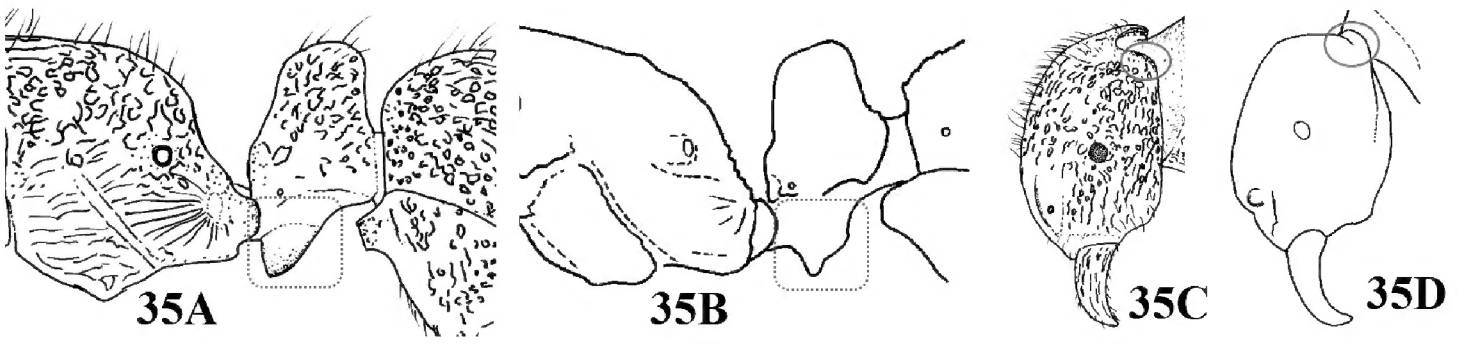


Figure 35. A, C *G. nanlingensis* worker **B, D** *G. sichuanensis* worker (Cited from Lattke, 2004) .

8 Eye medium-sized, with 7 ommatidia on maximum diameter; declivity transversely striate ..... ***G. taivanensis*** **Wheeler**
– Eye small-sized, with 5 ommatidia on maximum diameter; declivity irregularly rugose **9**
9 In lateral view petiolar node roughly subquadrate; subpetiolar process subquadrate (Fig. 36A)..... ***G. quadrutinodules*** **Chen, Lattke & Zhou, sp. n.**
– In lateral view petiolar node roughly trapezoidal; subpetiolar process polygonal, anteroventral corner corner acute, ventral margin straight, posteroventral bluntly angular (Fig. 36B)..... ***G. coccina*** **Zhou**

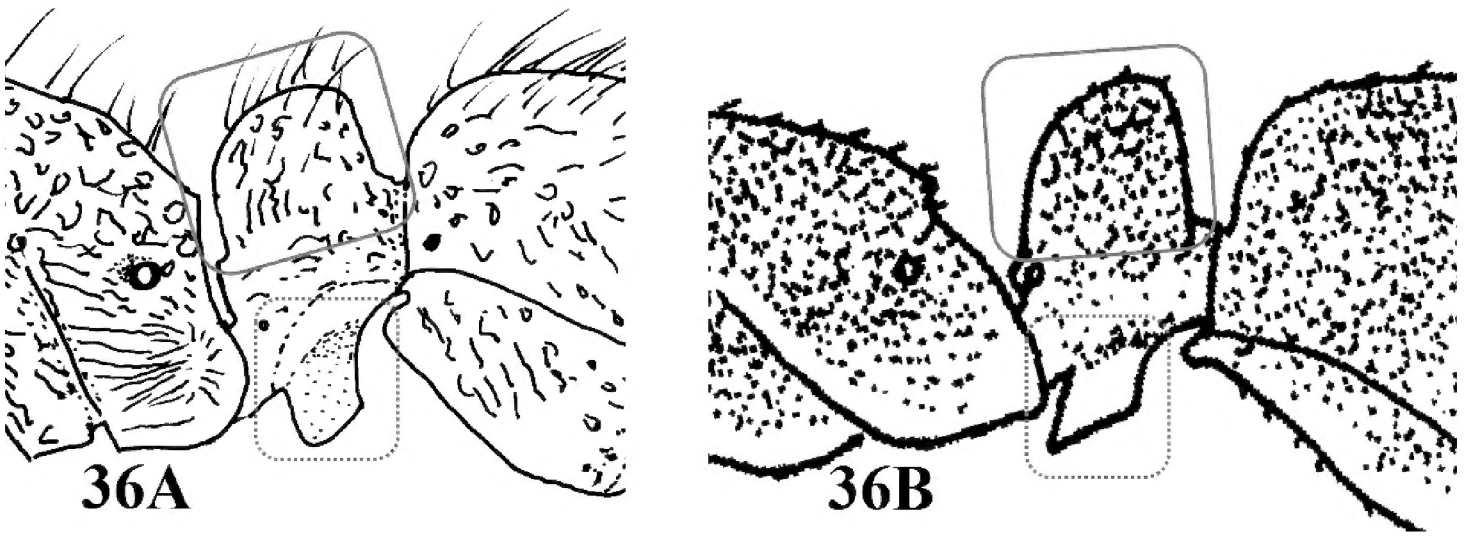


Figure 36. A *G. quadrutinodules* worker **B** *G. coccina* worker (Cited from Zhou, 2001).

Acknowledgements

We are most thankful to Dr. Himender Bharti and Dr. Michael Ohl, whose suggestions helped to significantly improve the manuscript. We are grateful to Chunwen Lu (Guangxi Normal University, China) for collecting the type specimens of *G. quadrutinodules*. This study was supported by the National Natural Science Foundation of China (No. 31372248 & 31672343), the Ministry of Science and Technology of China (No. 2015FY210300) and Natural Science Foundation of Guangxi (No. 2016GXNSFBA380024).

References

Bolton B (1975) A revision of the ant genus *Leptogenys* Roger in the Ethiopian region, with a review of the Malagasy species. Bulletin of the British Museum (Natural History) (Entomology) 31: 235–305. https://doi.org/10.5962/bhl.part.29487

Bolton B (2016) An online catalog of the ants of the world. http://antwiki.org [accessed 7 August 2016]

Brown Jr WL(1948) A new *Stictoponera*, with notes on the genus (Hymenoptera: Formicidae). Psyche 54: 263–264. https://doi.org/10.1155/1947/63091

Brown Jr WL (1958) Contributions towards a reclassification of the Formicidae. II. Tribe Ectatommini. Bulletin of the Museum of Comparative Zoology 118: 171–362.

Emery C (1889) Formiche di Birmania e del Tenasserim raccolte da Leonardo Fea (1885–87). [part] Annali del Museo Civico di Storia Naturale 27[= (2)7]: 485–512.

Forel A (1900) Les Formicides de l'Empire des Indes et de Ceylan. Part VII. Journal of the Bombay Natural History Society 13: 303–332.

Guenard B, Dunn RR (2012) A checklist of the ants of China. Zootaxa 3358: 1–77.

Lattke JE (1995) A revision of the ant genus *Gnamptogenys* in the New World. Journal of Hymenoptera Research 4: 137–193.

Lattke JE (2003) Biogeographic analysis of the ant genus *Gnamptogenys* Roger in south–east Asia – Australasia (Hymenoptera: Formicidae: Ponerinae). Journal of Natural History 37: 1879–1897. https://doi.org/10.1080/00222930210135631

Lattke JE (2004) A taxonomic revision and phylogenetic analysis of the ant genus *Gnamptogenys* Roger in Southeast Asia and Australasia (Hymenoptera: Formicidae: Ponerinae). University of California Publications in Entomology 122: 1–266. https://doi.org/10.1525/california/9780520098442.001.0001

Lattke JE, Fernandez F, Palacio EE (2007) Identification of the species of *Gnamptogenys* Roger in the Americas. In: Snellng RR, Fisher BL, Ward PS (Eds) Advances in Ant Systematics (Hymenoptera: Formicidae): Homage to E.O. Wilson – 50 years of contributions. Memoirs of the American Entomological Institute 80, 254–285.

Terayama M (2009) A synopsis of the family Formicidae of Taiwan (Insecta: Hymenoptera). Research Bulletin of Kanto Gakuen University. Liberal Arts 17: 81–266.

Wang W, Zhao Y (2009) A taxonomic study on the family Formicidae from Hubei Province. Huayu Nature Book Trade, China, 210 pp.

Wheeler WM (1929) Ants collected by Professor F. Silvestri in Formosa, the Malay Peninsula and the Philippines. Bollettino del Laboratorio di Zoologia Generale e Agraria della Reale Scuola Superiore d'Agricoltura. Portici 24: 27–64.

Wheeler WM (1930) A list of the known Chinese ants. Peking Natural History Bulletin 5: 53–81.

Wu J, Xiao G (1987) A new species of the genus *Gnamptogenys* from China. Scientia Silvae Sinicae 23: 303–305.

Wu J, Wang CL (1995) The Ants of China. China Forestry Publishing House, Beijing, 214 pp. [In Chinese]

Xu ZH, Zhang W (1996) A new species of the genus *Gnamptogenys* (Hymenoptera: Formicidae: Ponerinae) from southwestern China. Entomotaxonomia 18: 55–58.

Xu ZH (2002) A study on the biodiversity of Formicidae ants of Xishuangbanna Nature Reserve. Yunnan Science and Technology Press. Kunming, 181 pp.

Zhou SY (2001) Ants of Guangxi. Guangxi Normal University Press, Guilin, 255 pp. [In Chinese.]

Zhou SY, Ran H (2010) Checklist of Poneromorph Subfamilies (Hymenoptera: Formicidae) in China. Journal of Guangxi Normal University: Natural Science Edition 28(4):101–113.